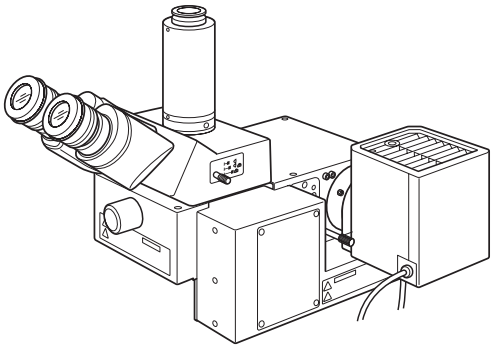
OLYMPUS®

Modules described in this manual

BXFMA-F
U-FH
U-IFFH
U-BI30-2, U-TR30-2, etc.
U-LH100-3



INSTRUCTIONS

BXFMA

MOTORIZED ILLUMINATION SYSTEM WITH MOTORIZED FOCUSING UNIT

This instruction manual is for the Olympus Motorized Illumination System with Motorized Focusing Unit, Model BXFMA. To ensure the safety, obtain optimum performance and to familiarize yourself fully with the use of this system, we recommend that you study this manual thoroughly before operating the system. Retain this instruction manual in an easily accessible place near the work desk for future reference.

AX7615

—— *This publication is printed on 100% recycled paper* ——

CONTENTS

Correct assembly and adjustments are critical for the microscope to exhibit its full performance. If you are going to assemble the microscope yourself, please read Chapter 8, "ASSEMBLY" (pages 23 to 28) carefully.

IMPORTANT – Be sure to read this section for safe use of the equipment. 1-3

1 SYSTEM DIAGRAM 4

2 NOMENCLATURE 5-7

3 REFLECTED LIGHT BRIGHTFIELD/DARKFIELD OBSERVATION PROCEDURE 8-9

4 USING THE CONTROLS 10-16

4-1 Power Supply Unit TH4 10

4-2 Motorized Illuminator with Motorized Focusing Unit BXFMA-F 10-13

1 Selecting the Observation Light Path 2 Centering the Field Iris Diaphragm (FS)
3 Centering the Aperture Iris Diaphragm (AS) 4 Adjusting the Motorized Focusing Unit
5 Using the Filters

4-3 Observation Tube 14-15

1 Adjusting the Interpupillary Distance 2 Adjusting the Diopter
3 Using the Eye Shades 4 Using Eyepiece Micrometer Disks
5 Selecting the Light Path of Trinocular Observation Tube
6 Adjusting the Tilt

4-4 Differences in Operating Procedures of Software BX2-BSW 16

1-2 Setting Procedure BX2-BSW Help

5 TROUBLESHOOTING GUIDE 17-18

6 SPECIFICATIONS 19

7 OPTICAL CHARACTERISTICS «UIS2 (UIS) Series» 20-22

8 ASSEMBLY – See this section for the replacement of the light bulb. 23-28

IMPORTANT

The BXFMA-F motorized illuminator with motorized focusing unit can be installed in a user's system in combination with the BX-UCB control box as well as a PC (running the BX2-BSW software) or the U-HSTR2, U-FH focus adjustment knob unit and U-IFFH focus adjustment knob interface.
The instructions for the BX/UCB/U-HSTR2 and software (BX2-BSW, commands) are provided in separate instruction manuals. Please also refer to these manuals as required.

Motorized Controls

- **BF (brightfield)/DF (darkfield) switching operation**
- **AS (aperture iris diaphragm) opening/closing operation**
- **Focus adjustment operation**

Configuration of Instruction Manuals

This motorized illuminator can manifest its functions when it is combined with other modules. The instructions manuals for the following modules are prepared separately to the present instruction manual. Please read the manuals according to your own system.

Manual Name	Main Contents
BX-UCB/U-HSTR2	Functions of the Control Box (incorporating the power supply) and Hand Switch
BX2 Software for PC (CD-ROM) BX2-BSW Ver. 03.01 or higher	Methods of PC control of functions ★ **Normal operation is not available unless the specified software is used.**
TH4	External halogen lamp power supply
U-FWT/FWR/FWO	Motorized filter wheels (Only the U-FWR can be used in this system.)

Precautions When Unpacking the Microscope

◎To prevent deterioration in performance during transport, the illuminator is shipped with transport lock applied to the focusing unit, observation method switch and aperture iris diaphragm (AS) mechanism, Be sure to release the transport lock of these three modules before assembly, and engage the transport lock before the next transport of the illuminator.

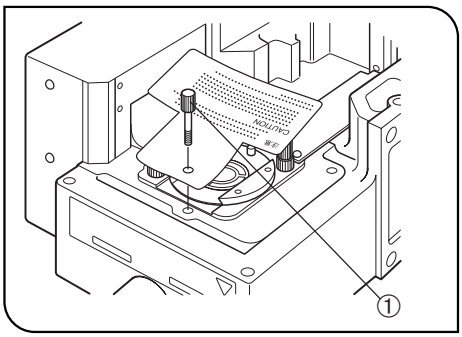


Fig. 1

Releasing the Transport Lock of the Observation Method (BF/DF) Switch Mechanism (Fig. 1)

Turn the lock knob ① counterclockwise to loosen it, and remove it together with the caution tag.

◎Retain the lock knob carefully because it will be used again the next time the equipment is transported.

To set transport lock:

1. Switch the observation method to DF (reflected light darkfield).
2. Turn the lock knob all the way clockwise.

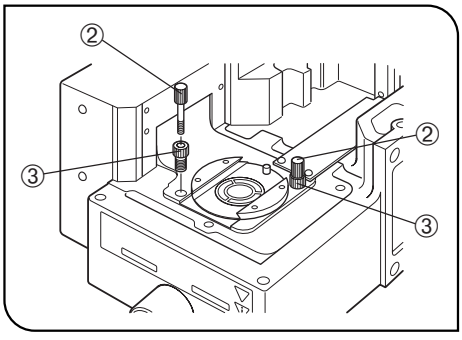


Fig. 2

Releasing the Transport Lock of the Focusing Unit Mechanism (Fig. 2)

1. Turn the two lock knobs ② counterclockwise to loosen and remove them.
2. Similarly to step 1, turn the two lock screws ③ to remove them.

◎Retain the lock knobs and lock screws carefully because they will be used again the next time the equipment is transported.

To set transport lock:

1. Raise the focusing unit to the higher limit position.
2. Turn the two lock screws all the way clockwise.
3. Similarly to step 2, turn and tighten the too lock knobs.

⚠ SAFETY PRECAUTIONS

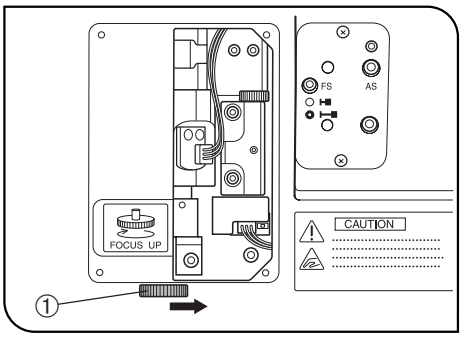


Fig. 3

1. Keep your hands apart from the revolving nosepiece during focusing operation and while the main switch of the BX-UCB control box is set to "I" (ON). If your finger is caught by the up/down movement of the revolving nosepiece, an injury such as bone fracture my result.
   Should your finger be caught by the revolving nosepiece, lower it with the following method:
   • Set the main switch to "O" (OFF), remove the right side panel of the illuminator using a Phillips screwdriver and turn the manual knob ① inside the panel in the opposite direction to the direction shown in the figure (i.e. clockwise) to lower the revolving nosepiece. (Fig. 3)
2. Emergency stop of focus operation is possible by turning the focus adjustment knob on the microscope frame or on the U-FH (in either direction), or by pressing the FOCUS control button (△, ▽, F/C or ESC), after focus operation has been activated (except when data is being downloaded to a PC).
   When the BX-UCB control box's main switch is set to "I" (ON), the focus operates automatically (the objective raises once and then returns to the original position) for initialization. (It takes about 20 seconds.)
   If the above emergency procedure is performed during this automatic focus operation, the microscope stops operating. Should this happen, set the main switch to "O" (OFF) and then "I" (ON) again.
3. The surface of the lamp housing on the side of the illuminator becomes very hot. When installing the system, leave spaces of more than 10 cm around, particularly above the lamp housing.
4. Be careful not to touch the lamp housing when centering the aperture iris diaphragm or controlling the field iris diaphragm. You run the risk of burn if you touch the lamp housing while the lamp is lit or immediately after it is turned off.
5. Route the connection cables away from the lamp housing. Should a cable comes in contact with the hot lamp housing, the cable could melt and cause electric shock.
6. When installing the illuminator in an existing system, insert 6 bolts in the module installation screw holes and tighten firmly.

Safety Symbols

The following symbols are found on the motorized illumination system. Study the meaning of the symbols and always use the equipment in the safest possible manner.

Symbol	Explanation
	Be careful not to have your finger or hand caught (between the revolving nosepiece and illuminator or between the specimen and objective).
	Indicates that the surface becomes hot, and should not be touched with bare hands.
	Before use, carefully read the instruction manual. Improper use could result in personal injury to the user and/or damage to the equipment.
I	Indicates that the main switch is ON.
O	Indicates that the main switch is OFF.

Warnings

Warning engravings/sticklers are placed at parts where special precaution is required when handling and using the system. Always heed the warnings.

Warning engraving positions	Lamp housing (U-LH100L-3, U-LH100-3)	(High Temperature warning)	
Warning sticker positions	Motorized illuminator BXFMA-F	(Finger injury warning)	
	Active AF unit U-AFA1M	(Laser warning)	

1 Getting Ready

1. The illuminator is a precision instrument incorporating motorized parts. Always install it horizontally (it is inhibited to install it on the side panel), handle it with care and avoid subjecting it to sudden or severe impact.
2. Do not use the system where it is subjected to direct sunlight, high temperature and humidity, dust or vibrations. (For operating conditions, see Chapter 6, "SPECIFICATIONS" on page 19).
3. Only one intermediate attachment can be used, by installing the U-AFA1M active AF unit, U-CA magnification changer or U-EPA2 eye point adjuster above the motorized illuminator.

2 Maintenance and Storage

1. To clean the lenses and other glass components, simply blow dirty away using a commercially available blower and wipe gently using a piece of cleaning paper (or clean gauze).
   If a lens is stained with fingerprints or oil smudges, wipe it gauze slightly moistened with commercially available absolute alcohol.

▲Since the absolute alcohol is highly flammable, it must be handled carefully.
Be sure to keep it away from open flames or potential sources of electrical sparks — for example, electrical equipment that is being switched on or off.
Also remember to always use it only in a well-ventilated room.

2. Do not attempt to use organic solvents to clean the non-optical components of the microscope system. To clean them, use a lint-free, soft cloth slightly moistened with a diluted neutral detergent.
3. Never attempt to disassemble any part of the microscope system.
4. When not using the microscope, set the main switch to "O" (OFF), wait until the lamp housing has cooled down, and cover the microscope with a dust cover before storage.
5. When disposing of this product, check the regulations and rules of your local government and be sure to observe them.

3 Caution

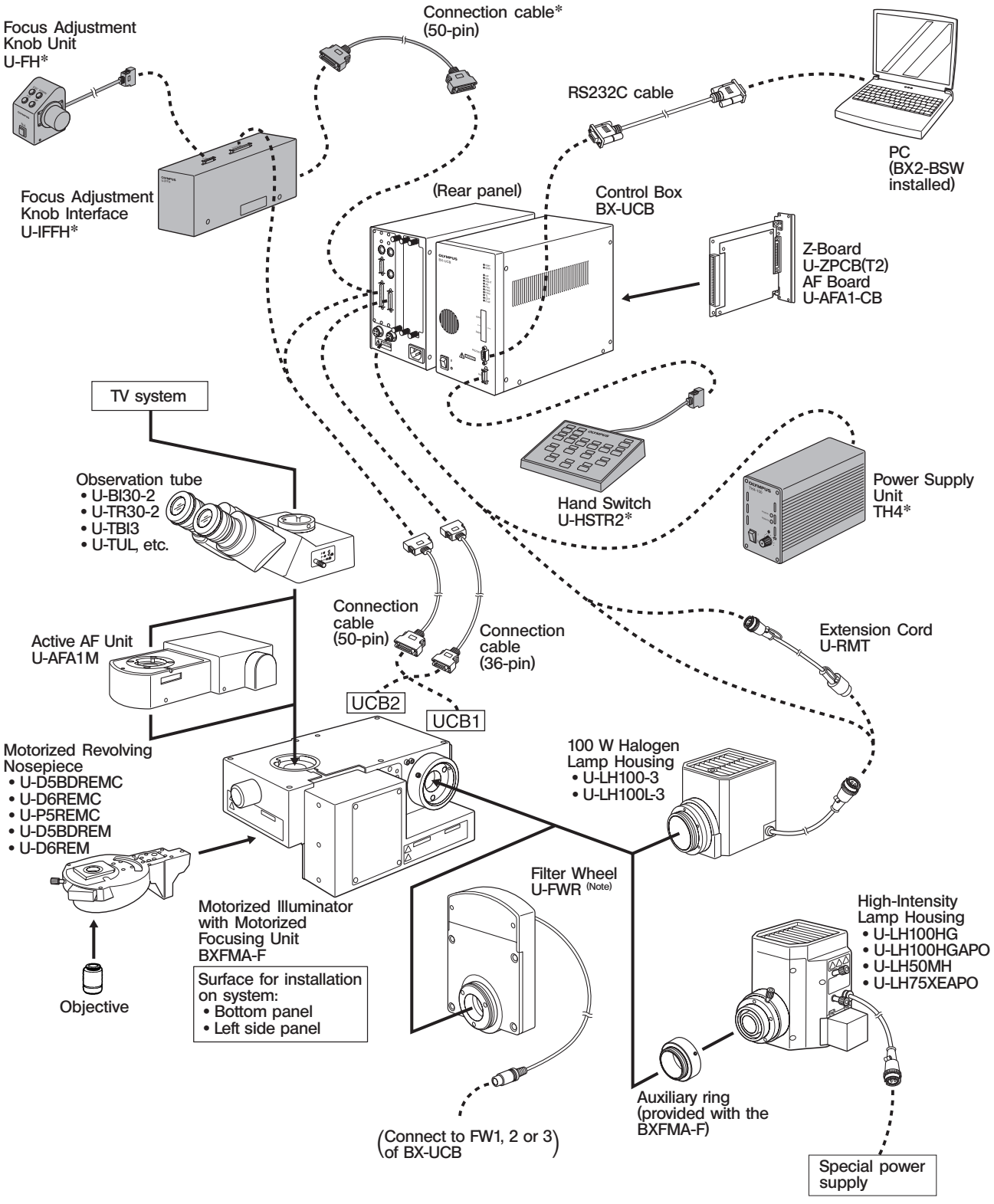
If the system is used in a manner not specified by this manual, the safety of the user may be imperiled. In addition, the equipment may also be damaged. Always use the equipment as outlined in this instruction manual.

The following symbols are used to set off text in this instruction manual.
▲: Indicates that failure to follow the instructions in the warning could result in bodily harm to the user and/or damage to equipment (including objects in the vicinity of the equipment).
★ : Indicates that failure to follow the instructions could result in damage to equipment.
◎ : Indicates commentary (for ease of operation and maintenance).

1 SYSTEM DIAGRAM

◎The modules marked * are not required when a PC is used to control all operations from the PC.

⚠**The PC used in this system should meet the requirements by IEC60950. Be sure to use an Olympus-designated connection cord. If a non-designated connection cord is used, Olympus cannot guarantee any performance of the system.**

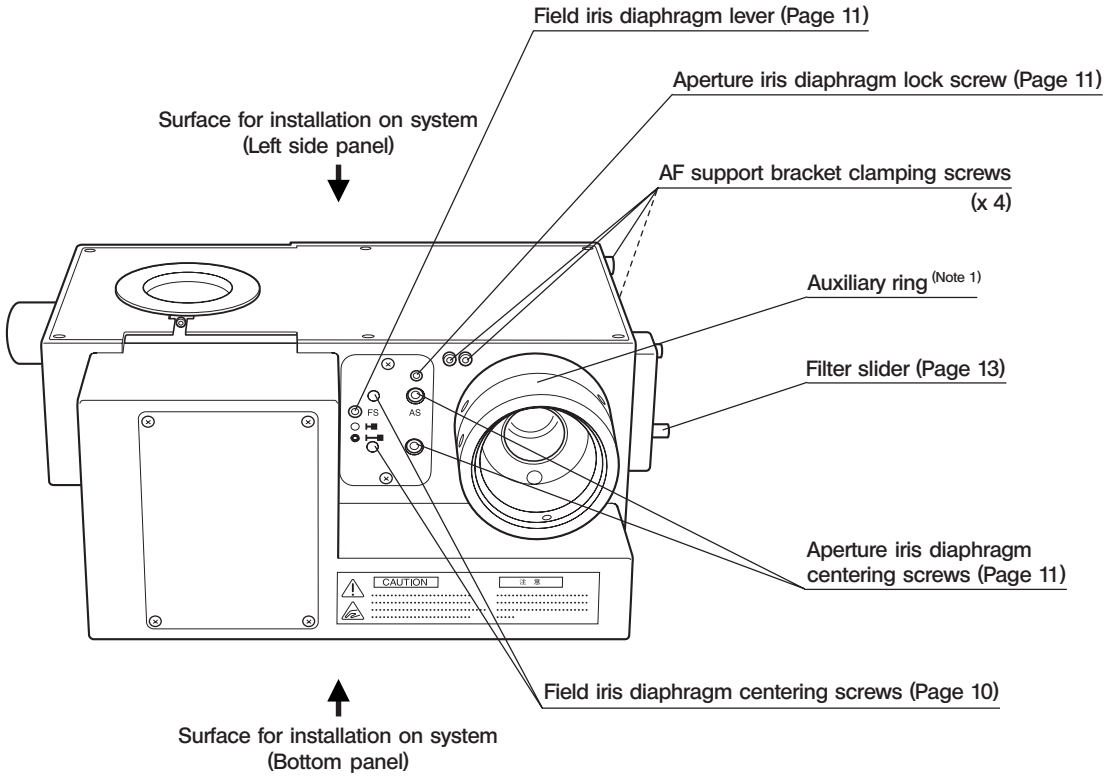


(Note) The cable of the U-FWR filter wheel runs close to the lamp housing when the filter wheel is attached. Position the cable so that it does not come in contact with the lamp housing.

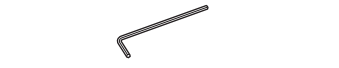
2 NOMENCLATURE

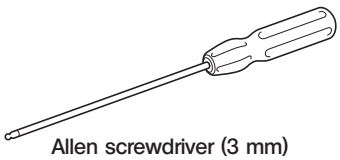
Motorized Illuminator with Motorized Focusing Unit BXFMA-F

◎The observation method (BF/DF) switching, aperture iris diaphragm opening/closing and focus adjustment (which can also be controlled using the U-FH focus adjustment knob unit) can be controlled using the BX2-BSW software run on the PC.

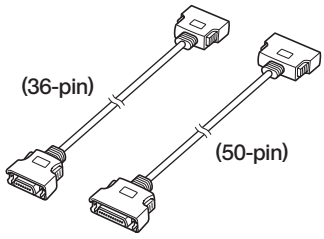


(Note 1) The auxiliary ring is for use with the high-intensity lamp housing. When the halogen lamp housing is used, remove the ring by loosening the 2 clamping screws using the Allen screwdriver.

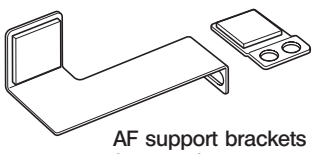

Allen wrench (1.5 mm)

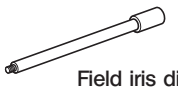

Allen screwdriver (3 mm)

Seals (x 6)



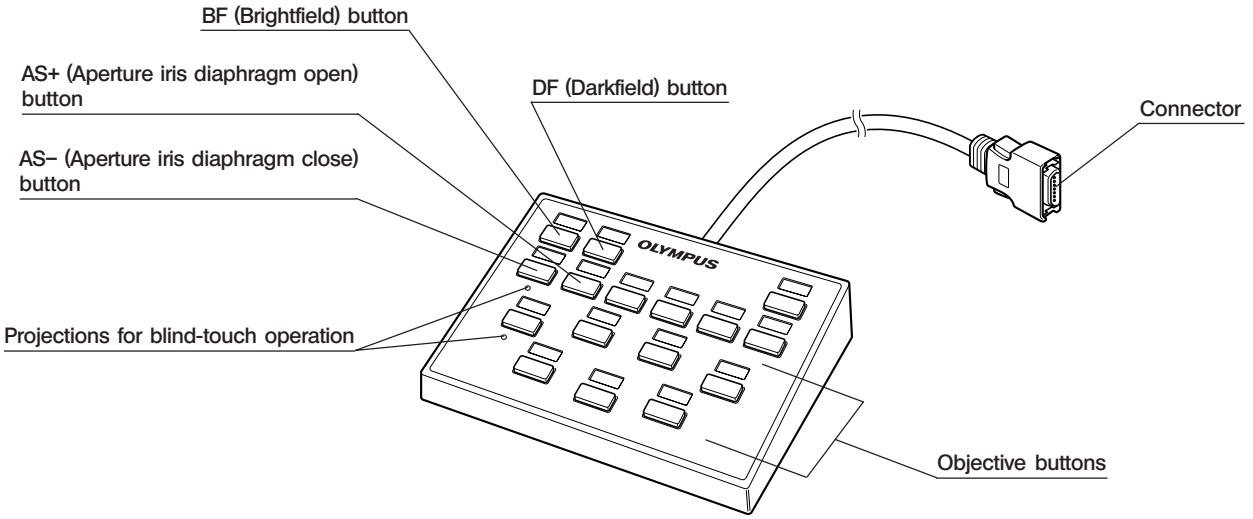
Connection cable


AF support brackets
(Page 28)

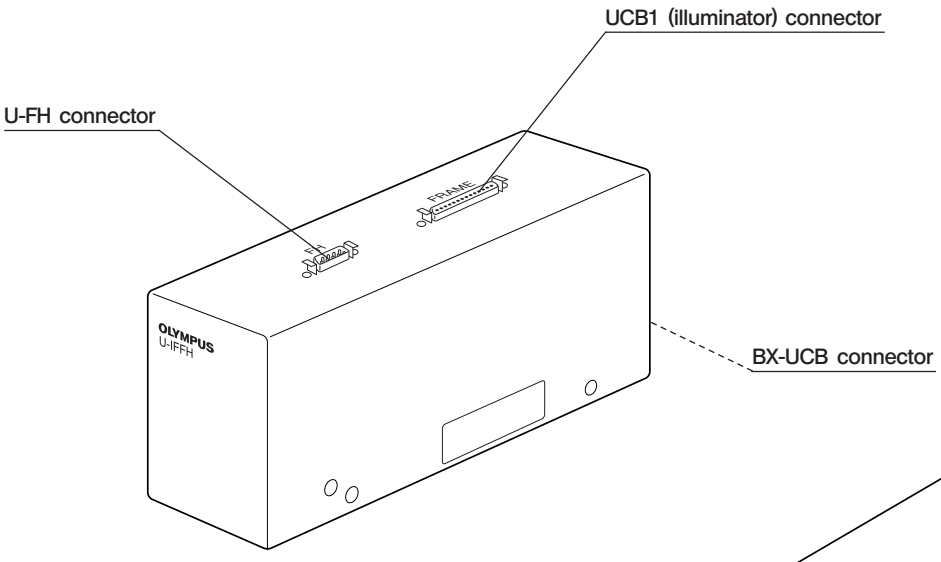

Field iris diaphragm auxiliary lever
(Detachable)

Hand Switch U-HSTR2

◎The button functions shown below refer to those in the standalone operation.
The button functions can be set arbitrarily when PC control (remote control) is used.
For other operating instructions, refer to the BX-UCB/U-HSTR2 instruction manual.

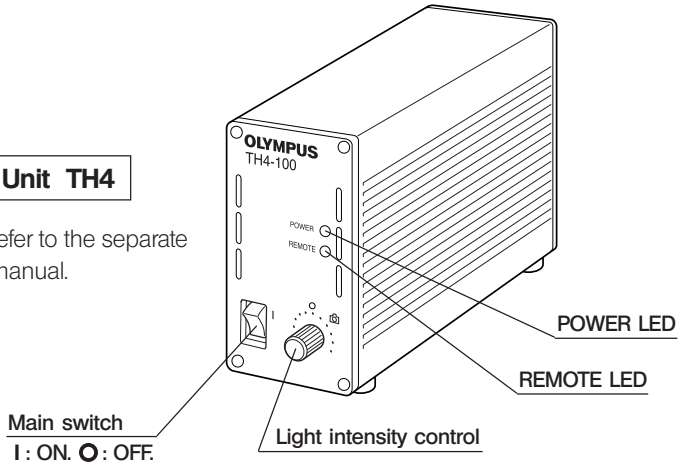


Focus Adjustment Knob Interface U-IFFH



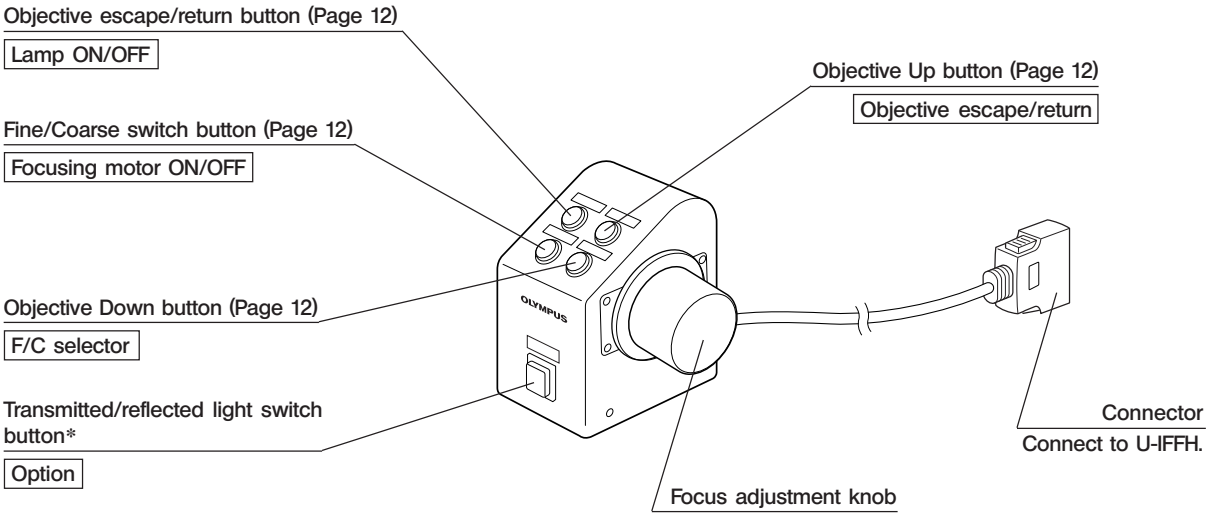
Power Supply Unit TH4

◎For details, refer to the separate instruction manual.



Focus Adjustment Knob Unit U-FH

The button functions shown below refer to those in the standalone operation.
The button functions indicated inside [ ] are the initial settings in the control from a PC running the BX2-BSW software.
The button functions in PC control can also be set arbitrarily. For their allocation, refer to the tutorial or help of the BX2-BSW software (Ver. 03.01 or higher).
After deciding the button functions, attach the provided function name stickers near the buttons.
For the abbreviations and symbols, refer to the table at the bottom of this page.

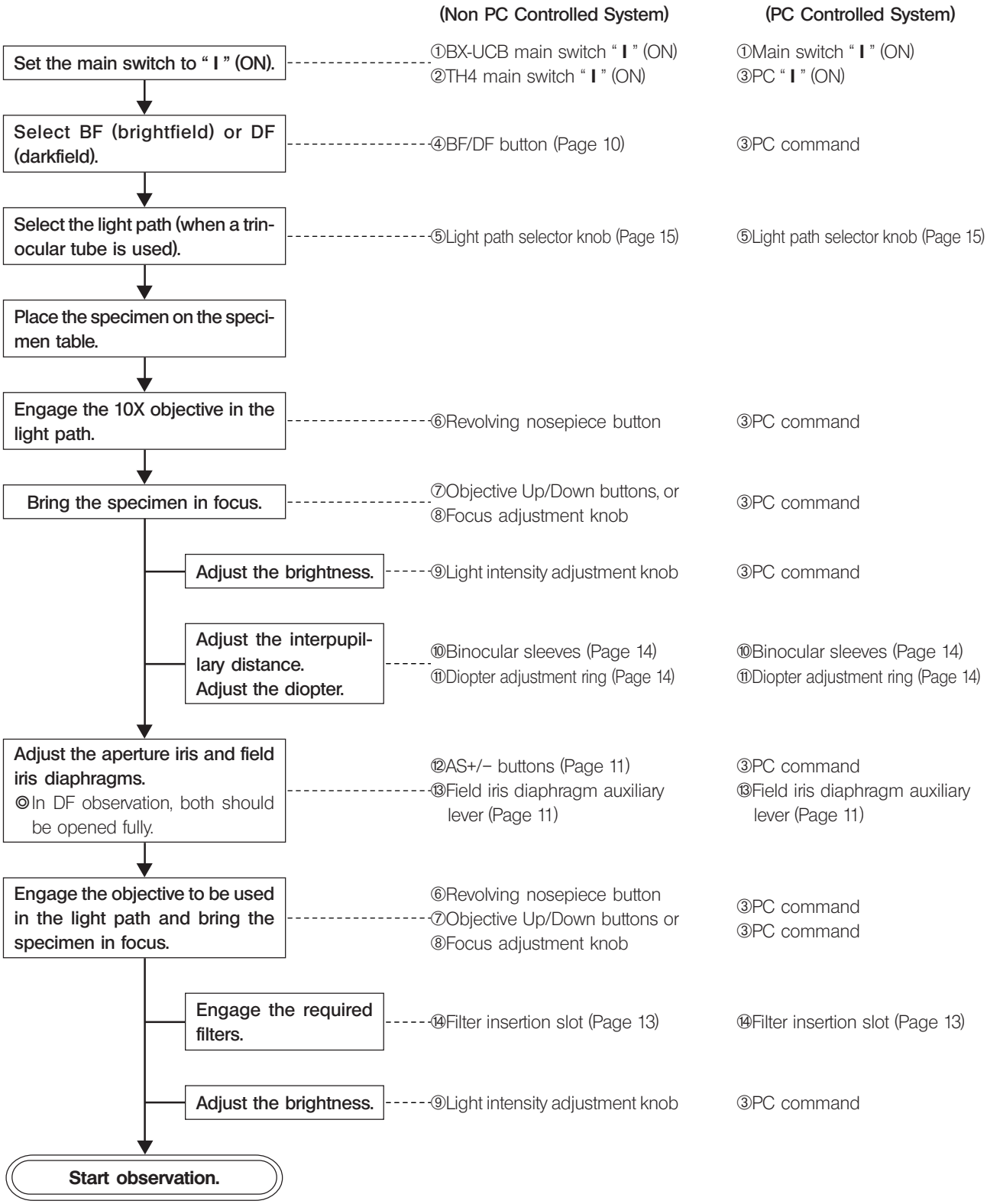


* If the halogen bulb does not light up, press this button once.

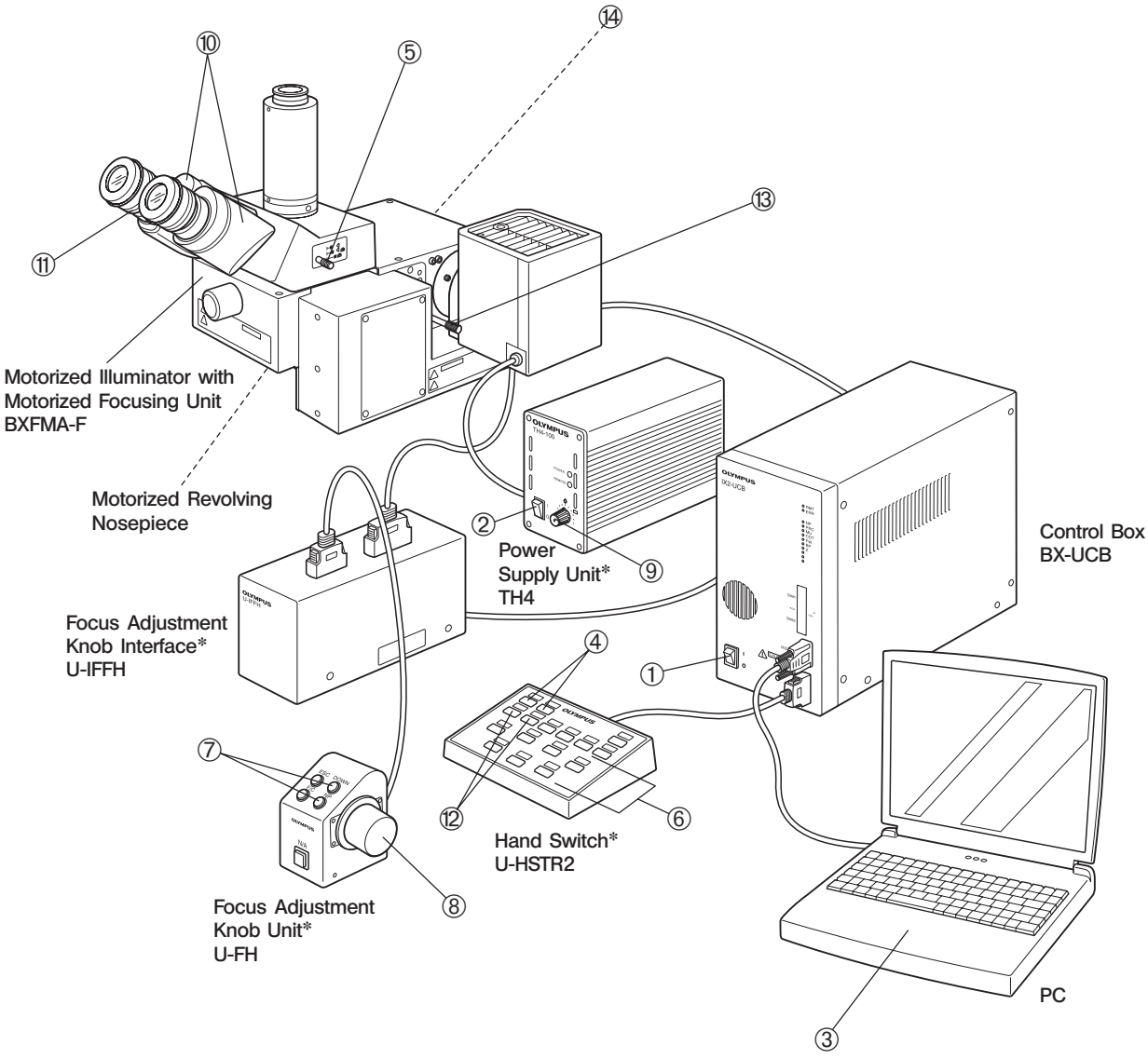
Abbreviation or Symbol	Function	Remark
F/C	Fine/Coarse switching	
⏻	Lamp ON/OFF	
📷	Photo voltage ON/OFF	Not used with the BXFMA.
FRM/FH	Focus adjustment frame/U-FH	
Z.EX.	Z-focusing motor ON/OFF	OFF for electrical noise reduction
ESC	Objective escape/return	
SHUT	Shutter IN/OUT	Not used with the BXFMA.
T.LENS	Condenser top lens IN/OUT	
▼ / ▲	Up/down operation such as light intensity or objective height adjustment	Write the applicable functions in the blank areas using an oil-ink pen.
◀ / ▶	Left/right operation such as mirror unit or filter wheel movement	

3 REFLECTED LIGHT BRIGHTFIELD/DARKFIELD OBSERVATION PROCEDURE

◎The following flow chart pertains to the reflected light brightfield/darkfield observations.
The controls used for a system using the U-HSTR2 hand switch, U-FH focus adjustment knob unit and TH4 power supply unit for halogen bulb together with those used for a PC-controlled system.
For details on the PC control, also refer to the tutorial or help provided with the BX2-BSW software.


(Non PC Controlled System)
(PC Controlled System)
Set the main switch to " I " (ON).
①BX-UCB main switch " I " (ON)
②TH4 main switch " I " (ON)
①Main switch " I " (ON)
③PC " I " (ON)
Select BF (brightfield) or DF (darkfield).
④BF/DF button (Page 10)
③PC command
Select the light path (when a trinocular tube is used).
⑤Light path selector knob (Page 15)
⑤Light path selector knob (Page 15)
Place the specimen on the specimen table.
Engage the 10X objective in the light path.
⑥Revolving nosepiece button
③PC command
Bring the specimen in focus.
⑦Objective Up/Down buttons, or
⑧Focus adjustment knob
③PC command
Adjust the brightness.
⑨Light intensity adjustment knob
③PC command
Adjust the interpupillary distance.
Adjust the diopter.
⑩Binocular sleeves (Page 14)
⑪Diopter adjustment ring (Page 14)
⑩Binocular sleeves (Page 14)
⑪Diopter adjustment ring (Page 14)
Adjust the aperture iris and field iris diaphragms.
◎In DF observation, both should be opened fully.
⑫AS+/− buttons (Page 11)
⑬Field iris diaphragm auxiliary lever (Page 11)
③PC command
⑬Field iris diaphragm auxiliary lever (Page 11)
Engage the objective to be used in the light path and bring the specimen in focus.
⑥Revolving nosepiece button
⑦Objective Up/Down buttons or
⑧Focus adjustment knob
③PC command
③PC command
Engage the required filters.
⑭Filter insertion slot (Page 13)
⑭Filter insertion slot (Page 13)
Adjust the brightness.
⑨Light intensity adjustment knob
③PC command
Start observation.

◎The modules marked * are not required when a PC is used to control all operations from the PC.



◎ Make a photocopy of the observation procedure pages and post it near your microscope.

4 USING THE CONTROLS

4-1 Power Supply Unit TH4

◎Please also refer to the separate instruction manuals. Note that, when the BX-UCB control box is used to supply the lamp power, the brightness should be controlled from the PC.

4-2 Motorized Illuminator with Motorized Focusing Unit BXFMA-F

◎The following description deals with the standalone operations in the system without using a PC.

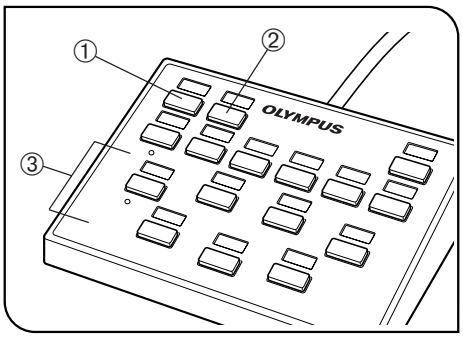


Fig. 4

1 Selecting the Observation Light Path (Fig. 4)

Press the BF button ① or DF button ② of the hand switch to set the mirrors for the desired observation system.

BF: Reflected light brightfield light path

DF: Reflected light darkfield light path

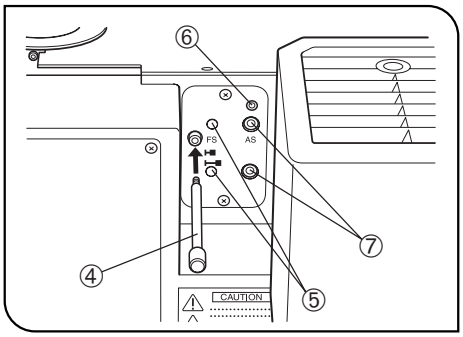
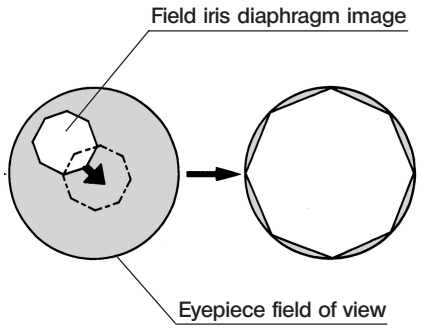


Fig. 5

2 Centering the Field Iris Diaphragm (FS) (Figs. 4 & 5)

◎Since the field iris diaphragm is usually used in the fully open condition, the illuminator employs a method in which the auxiliary lever ④ is inserted as required.

1. Press the BF button ① of the hand switch to select the reflected light brightfield light path.
2. Press the objective button ③ of the hand switch to engage the 10X objective in the light path, place the specimen on the specimen table and bring the specimen into approximate focus.
3. Screw the field iris diaphragm auxiliary lever ④ into the illuminator and pull the lever to stop down the field iris diaphragm.
4. Insert the Allen screwdriver, provided with the illuminator, into each of the two FS centering screws ⑤ and turn them until the field iris diaphragm image becomes concentric with the field iris.
5. While pushing in the field iris diaphragm auxiliary lever ④, open the field iris diaphragm until the field iris diaphragm image is inscribed with the field of view. If their centers are deviated, center the field iris diaphragm again.
6. Open the field iris diaphragm until the field iris diaphragm image circumscribes (becomes the same size as) the field of view.



Using the Field Iris Diaphragm

●In reflected light brightfield observation:
The field iris diaphragm adjusts the illuminated area in order to obtain high-contrast images.
Adjust the field iris diaphragm auxiliary lever ④ of the illuminator according to the objective in use so that the field iris diaphragm image circumscribes the field of view and block penetration of excess light in the field.

●In reflected light darkfield observation:
Always open the field iris diaphragm fully by pushing in the field iris diaphragm auxiliary lever ④ all the way.

3 Centering the Aperture Iris diaphragm (AS) (Figs. 4 to 6)

★The aperture iris diaphragm is locked by a lock screw ⑥ (Fig. 5) on the illuminator. Be sure to unlock it by loosen the screw using the Allen screwdriver (3 mm), provided with the illuminator, before proceeding to centering.
After completing centering, be sure to lock the diaphragm again to prevent its malfunction.

1. Press the BF button ① of the hand switch to select the reflected light brightfield light path.
2. Press the objective button ③ (Fig. 4) of the hand switch to engage the 10X objective in the light path, place the specimen on the specimen table and bring the specimen into approximate focus.

◎It is recommended to use a highly reflective specimen such as a mirror to facilitate viewing the aperture iris diaphragm image.

3. Remove an eyepiece, look into the eyepiece sleeve and press the AS- button ⑧ of the hand switch to stop down the aperture iris diaphragm to about 70% opening.
4. If the center of the aperture iris diaphragm is deviated, insert the Allen screwdriver into the two AS centering screws ⑦ (Fig. 5) and adjust them to center the aperture iris diaphragm.

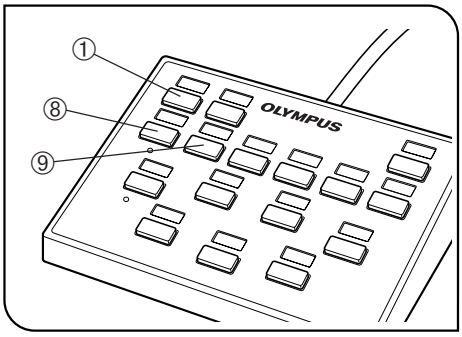
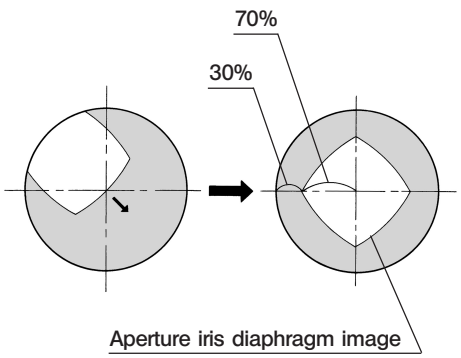


Fig. 6



Using the Aperture Iris Diaphragm

●In reflected light brightfield observation:
In general, optimum observation is possible by controlling the aperture iris diaphragm to between 70% and 80% of the aperture number of the objective.

●In reflected light darkfield observation:
Always open the field iris diaphragm fully by pushing the AS+ button ⑨.

◎With certain specimens, images with high contrast and little flare can be observed by stopping down the aperture iris diaphragm below the standard aperture.

4 Adjusting the Motorized Focusing Unit

★ **Make sure that the specimen is located near the standard focusing position (see diagram on page 25).**

◎ Motorized focusing control is available using a PC or the U-FH focus adjustment knob unit.

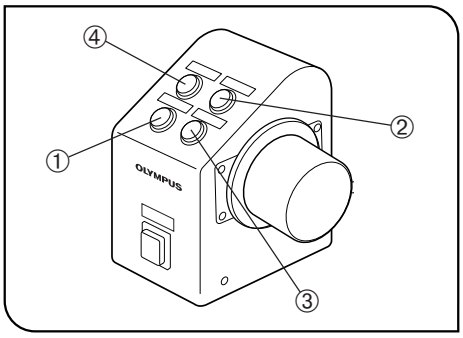


Fig. 7

Using the U-FH Focus Adjustment Knob Unit (Fig. 7)

• F/C button ①

This button switches the objective adjustment movement caused by turning the focus adjustment knob between Fine and Coarse movements.

◎ For safety, the initial position that is set automatically when the main switch of the BX-UCB control box is set to " **I** " (ON) is "F".

Fine adjustment: 0.1 mm per turn

Coarse adjustment: 1 mm per turn

• Objective Up button ②/Down button ③

Press either button to raise or lower the objective.

★ **When pressing the objective Down button, take care against collision between the objective and specimen.**

• Objective escape/return button ④

Before replacing the specimen, press this button to cause the objective escape. Pressing the button again causes the objective return to the original position.

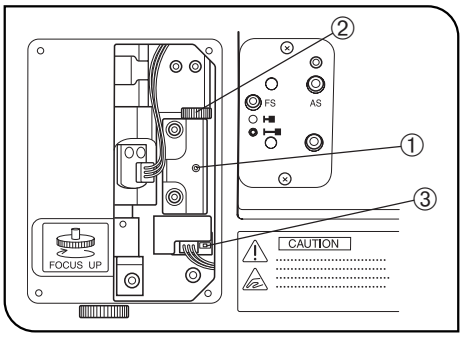


Fig. 8

Objective Lower Hardware Limit Adjustment (Fig. 8)

– Adjust the lower hardware limit using the following procedure. –

◎ The lower hardware limit of the objective has been set to the lower limit of the stroke before the system left the factory.

▲ **During adjustment, do not approach your hand to the motor drive mechanism so that your finger does not be caught by it.**

★ **The lower hardware limit determines the lower limit of the objective to prevent it from collide with the specimen. As a result, note that there is a risk of collision with specimen or reaching the lower limit before the focusing position when the specimen is not flat, the specimen thickness is changed or the WD (Working Distance) of the objective in use is 1 mm or less.**

★ **Always use the procedure described below. Otherwise, it will not be possible to avoid collision of the objective with the specimen perfectly.**

★ **During adjustment, do not touch any electronic part to avoid its static destruction.**

★ **During adjustment, do not touch the motor mechanism or electronic part to avoid their malfunction.**

1. Set the main switch of the control box to " **I** " (ON).
2. Remove the side panel of the illuminator by removing the screws using a Phillips screwdriver.
3. Among the objectives mounted on the revolving nosepiece, engage the one with the shortest WD in the light path.

4. Approach the objective to the specimen until the height you want to set as the lower hardware limit height.
5. Loosen the limit position clamping screw ① using the provided Allen wrench (width across flats 1.5 mm).
6. Turn the limit position adjustment knob ② until the LED ③, which has been OFF, turns ON.
7. Tighten the limit position clamping screw ① using the Allen wrench (width across flats 1.5 mm).

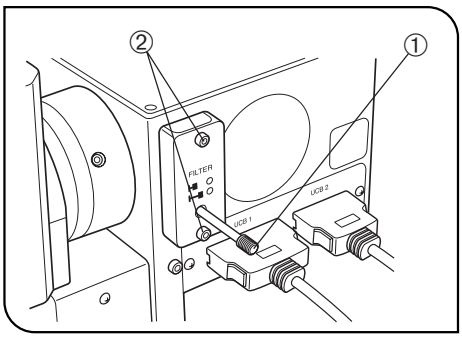


Fig. 9

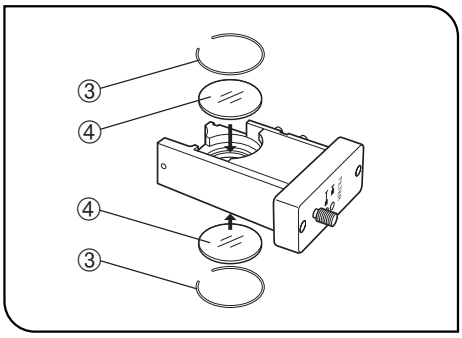


Fig. 10

5 Using the Filters (Figs. 9 & 10)

◎Filters (Up to two filters*) can be inserted in the filter slider, which can be engaged in or disengaged from the light path using a knob ①.

*The two filters are always engaged or disengaged together.

Inserting the Filters

1. Using the Allen screwdriver, loosen and remove the screws ② clamping the filter slider.
2. Take out the push ring ③ from the filter slider, place the desired filter(s) ④ and hold the filter(s) with the push ring.
3. Attach the filter slider to the original position.

Applicable Filters and Their Purposes

Applicable Filter	Purpose
32LBD	Color temperature conversion filter for turning the illumination light to daylight. For use in general observation or color photomicrography.
32IF550	Green filter for giving contrast to a monochrome image. For use in monochrome photomicrography.
32ND25	Light adjustment filter. (Transmittance 25%)
32ND6	Light adjustment filter (Transmittance 6%)
32FR	Frost filter obtaining regular illumination field, though the brightness is reduced slightly.

4-3 Observation Tube

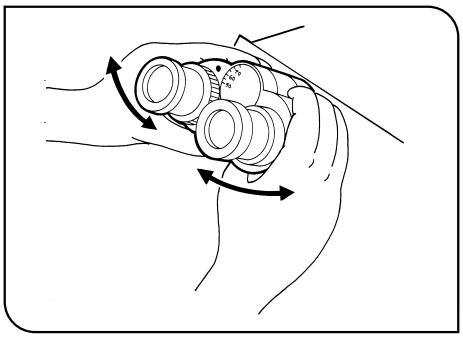


Fig. 11

1 Adjusting the Interpupillary Distance (Fig. 11)

While looking through the eyepieces, adjust for binocular vision until the left and right fields of view coincide completely. The index dot • indicates the interpupillary distance.

◎Note your interpupillary distance so that it can be quickly duplicated.

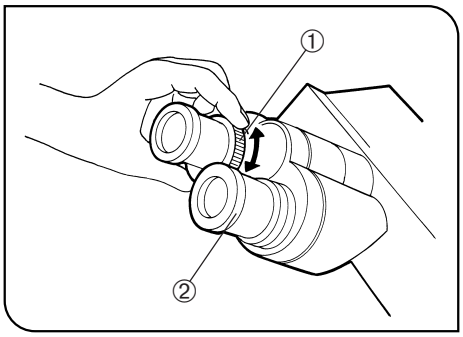


Fig. 12

2 Adjusting the Diopter (Figs. 12 & 13)

1. Looking through the eyepiece without the diopter adjustment ring, rotate the focus adjustment knob to bring the specimen into focus.
2. Looking through the eyepiece with the diopter adjustment ring ①, turn it to focus on the specimen. (Fig. 12)

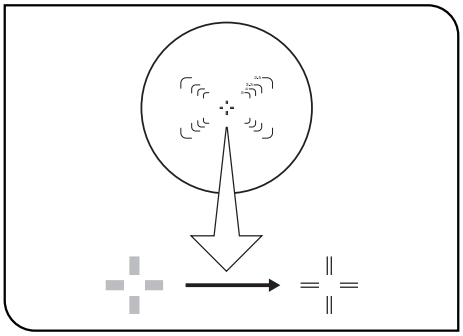


Fig. 13

Using a Finder Eyepiece

1. Looking through the right eyepiece with your right eye, turn the diopter adjustment ring ② at the top of the eyepiece until clearly defined double crosslines can be seen in the field of view. (Figs. 12 & 13)
2. Looking through the right eyepiece, rotate the focus adjustment knobs to bring the specimen and double crosslines into simultaneous focus.
3. Looking through the left eyepiece with your left eye, turn the diopter adjustment ring ① to focus on the specimen.

Using an Super Widefield Observation Tube

The operation is basically identical to the above. However, as the left eyepiece of the super widefield tube does not have the diopter adjustment ring, focus on the specimen by turning the top of the left eyepiece.

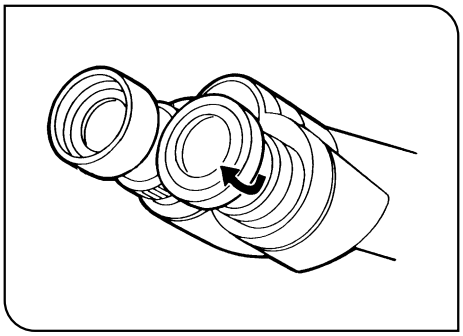


Fig.14

3 Using the Eye Shades (Fig. 14)

When Wearing Eyeglasses

Use with the eye shades in the normal, folded-down position. This will prevent the eyeglasses from being scratched.

When Not Wearing Eyeglasses

Extend the folded eye shades in the direction of the arrow to prevent extraneous light from entering between the eyepieces and eyeglasses.

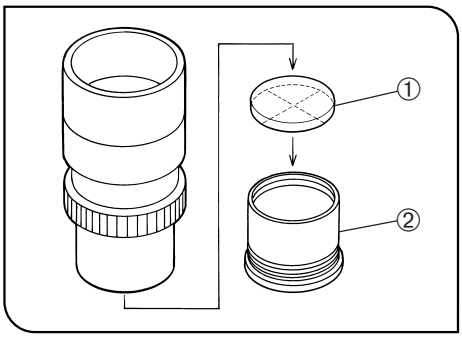


Fig. 15

4 Using Eyepiece Micrometer Disks (Fig. 15)

Eyepiece micrometer disks can be inserted into the WHN10X-H (or WHN10X) eyepieces.
However, if the eyepiece does not have the helicoid adjustment facility and your eyesight is poor, you may have difficulties in focusing on the eyepiece micrometer disk. In this case, it is recommended to look into the eyepiece through your eyeglasses.
Use 24 mm dia. x 1.5 mm thick micrometer disks.
Following Fig. 15, unscrew the micrometer mounting frame ② from the eyepiece and place a micrometer disk ① into the mounting frame. Reattach the micrometer mounting frame in the original position.

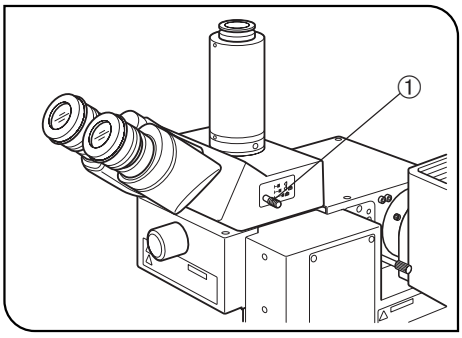


Fig. 16

5 Selecting the Light Path of Trinocular Observation Tube (Fig. 16)

Slide the light path selector knob ① to select the desired light path.

Trinocular Tube	Light Path Selector Position		
	Pushed in	Middle position	Pulled out
U-TR30-2	Binocular 100%	Binocular 20% TV, photo 80%	TV, photo 100%
U-SWTR-3			
U-ETR3	Binocular 100%		TV, photo 100%
U-SWETR			
U-SWETTR2	Binocular 100%		Binocular 20% TV, photo 80%

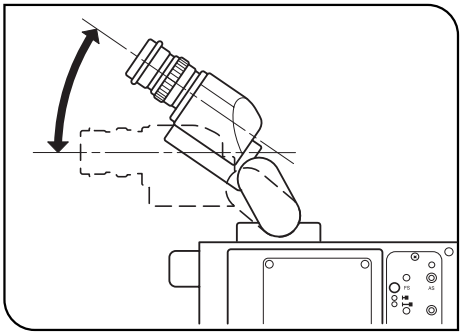


Fig. 17

6 Adjusting the Tilt (Fig. 17)

◎Adjust the height and tilt of the observation tube to obtain the most comfortable viewing position.
Holding the binocular section with both hands, raise or lower it to the desired position.

★ **Never attempt to force the binocular section past the upper or lower stop position. Applying excessive force could destroy the limiting mechanism.**

★ **The U-TBI3 cannot be used in combination with any intermediate attachment.**

4-4 Differences in Operating Procedures of Software BX2-BSW

◎The BX2-BSW software has been designed for controlling the motorized operations of the BX61 microscope system. When the illuminator is controlled from the BX2-BSW, some operations may differ from the information shown in the operation screens, tutorial and help of the software as described below.

1-2 Setting Procedure

1-2-2 Initial setting

2. Motorized unit setting (Device Type)

- Frame → Enter "BX61F" or "BX61WI". (Any can be entered without problem.)
- Reflected light illumination → BX-RLAA
- Filter wheel → U-FWR (The U-FWT cannot be used.)
- Autofocusing unit → U-AFA1M
- Focus adjustment knob unit → U-FH

(Note)
Text "enabled when the focus adjustment knob unit is installed" should be deleted.

3. Observation method setting (Microscopy Tab)

- Check only "EPI BF" (reflected light brightfield observation) and "EPI DF" (reflected light darkfield observation).

4. Mirror unit setting (Mirror Unit Tab)

- Enter "BF" or "DF".

6. Turret optical device and top lens setting (Condenser Tab)

- Do not register anything.

7. Filter setting (Filter Tab)

- The U-FWT cannot be used.

1-2-4 Button function allocation

1. Button selection

Main Unit Tab

- Allocation to all of buttons ① to ⑧ is possible with the PC screen operation.
- Even when button functions are allocated on the main unit, standalone operation on the main unit is impossible (because the buttons are not present).

Other caution

- The microscope illustrations in the operation screens show the BX61.

BX2-BSW Help

Focus adjustment range setting

- The relationship between the objective moving direction and the Near/Far Limits is identical to that of the BX61WI.
- The height values entered as the Near and Far Limits cannot exceed the lower hardware limit (which is adjustable).

5 TROUBLESHOOTING GUIDE

Under certain conditions, performance of the system may be adversely affected by factors other than defects. If problems occur, please review the following list and take remedial action as needed. If you cannot solve the problem after checking the entire list, please contact your local Olympus representative for assistance.

Problem	Cause	Remedy	Page
1. Optical System			
a) Bulb does not light.	The power cord of BX-UCB (or TH4) is unplugged.	Insert the power plug firmly into the power outlet.	–
	The main switch of BX-UCB (or TH4) is not on.	Set the main switch to " **I** " (ON).	9
	The transmitted light illumination is set for reflected light observation or vice versa.	Press the transmitted/reflected light switch button once.	7
	The bulb is burnt out.	Replace the bulb with a new specified bulb.	27
b) Bulb operates, but field of view remains dark.	The aperture and field iris diaphragms are not opened wide enough.	Open them to the proper sizes.	11
	The light path selector lever of trinocular tube is in an intermediate position.	Move the knob to position or .	15
c) Field of view is obscured or not evenly illuminated.	The light path selector lever of trinocular tube is in an intermediate position.	Set the knob according to the observation method.	15
	The revolving nosepiece is not correctly mounted.	Attach the revolving nosepiece correctly.	28
	The aperture iris diaphragm is not centered.	Center it.	11
	The field iris diaphragm is stopped down too far.	Open the field iris diaphragm until it circumscribes the field.	11
	The bulb is not mounted correctly.	Push the pins of halogen bulb all the way until the stop position.	27
d) Dirt or dust is visible in the field of view.	Dirt/dust on an eyepiece.	Clean it thoroughly.	3
	Dirt/dust on the specimen.		
	Dirt/dust on the objective top lens.		
e) Visibility is poor. Image is not sharp. Contrast is poor.	The objective and/or eyepieces in use are other than specified.	Use the specified objective and eyepieces.	20-22
	Dirt/dust on specimen.	Clean it thoroughly.	3
	Dirt/dust on objective top lens.		
	The aperture iris diaphragm is set improperly.	Set the aperture iris diaphragm properly.	11
f) One side of image is blurred. Image appears to waver.	The specimen is tilted.	Place specimen correctly.	–
	The revolving nosepiece is not correctly mounted.	Attach the revolving nosepiece correctly.	28
	The light axis is tilted because a heavier weight than restricted (3 kg) is applied to the revolving nosepiece mount area.	Reduce the number of modules to reduce the weight below the restriction.	–

Problem	Cause	Remedy	Page
2. Electrical System			
a) The bulb intermittently lights and goes out.	Bulb is nearly burnt out.	Replace the bulb.	27
	A cord or connector is not properly connected.	Check all cords and connectors to connect them securely.	–
b) Bulb burns out almost immediately.	A wrong type of bulb is being used.	Use the correct bulb type.	27
3. Focusing System			
a) The specimen cannot be brought into focus.	The specimen is positioned beyond the focusing range.	Adjust the hardware (or software) lower limit to an optimum height.	12-13
		Re-place the specimen within the focusing range.	12-13
4. Observation Tube			
a) Field of view of one eye does not match that of the other.	The interpupillary distance is incorrect.	Adjust the interpupillary distance.	14
	Incorrect diopter adjustment.	Adjust the diopter.	14
	Different eyepieces are used on left and right.	Change one eyepiece to match the other so that both sides are the same type.	–
	Your view is not accustomed to microscope observation.	When looking into eyepieces, do not stare at image from the beginning but see the overall field of view. It is sometimes recommended to turn your eyes away from the eyepieces, look far off and look into the eyepieces again.	–

6 SPECIFICATIONS

■ **Motorized Illuminator with Motorized Focusing Unit BXFMA-F**

Item	Specification			
Optical system	• UIS2 (UIS) (Universal Infinity System) optical system			
Illuminator	• Reflected Koehler illumination • Tube magnification: 1X (FN 26.5: Super-widefield compatible) • Observation method switching: Motorized BF (Brightfield)/DF (Darkfield) switching • Aperture iris diaphragm: Motorized opening/closing (diameter 0.4 to 11.1 mm), centering possible • Field iris diaphragm: Manual lever opening/closing, centering possible • Filter: Manual engagement/disengagement, up to 2 filters (ϕ32 mm filters) • Available observation methods: ① Reflected light brightfield observation, ② Reflected light darkfield observation • Light sources: 100W halogen bulb (standard), 100 W mercury burner or 75 xenon bulb			
Focusing unit	• Drive system: Motorized focusing using a stepping motor and ball screw. • Resolution: 0.01 μm • Highest speed: 5 mm/sec. (The factory setting of the BX-UCB control box is 3 mm/sec.) • Full stroke range: 5 mm (2 mm down and 3 mm up from the standard focusing position) (7 mm including the escape stroke)			
Revolving nosepiece	• Motorized revolving nosepiece: U-D5BDREMC, U-D6REMC, U-P5REMC, U-D5BDREM or U-D6REM			
Observation tube	U-BI30-2 Widefield binocular tube	U-TR30-2 Widefield trinocular	U-ETR3 Widefield erect trinocular	U-SWTR-3 Super-widefield trinocular
	FN 22			FN 26.5
	Tube tilting angle: Fixed			
	Interpupillary adjustment range: 50 mm to 76 mm			
Installation on system	• Installable surfaces: 2 surfaces (left side panel, bottom panel) • Installation method: 6 bolts			
Power supply sources	• Motorized controls: BX-UCB control box • Light source: The halogen bulb is powered from the TH4 power supply unit or BX-UCB control box.			
Motorized control	• Possible using control units (U-HSTR2 hand switch and U-FH focus adjustment knob unit) or PC (BX2-BSW software, commands).			
Operating environment	• Indoor use. • Altitude: Max. 2000 m • Ambient temperature: 10° to 35°C (50° to 95°F) • Maximum relative humidity: 15% to 85% • Supply voltage fluctuations: ±10% • Pollution degree: 2 (in accordance with IEC60664) • Installation/Overvoltage category: II (in accordance with IEC60664)			

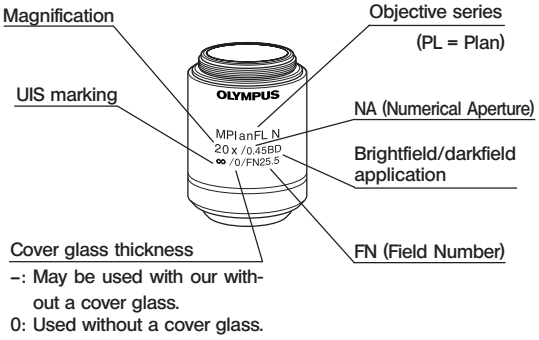
7 OPTICAL CHARACTERISTICS «UIS2 (UIS) Series»

– The UIS series objectives that are not mentioned below can also be mounted on this microscope. –

The table below shows the optical characteristics of different eyepiece and objective combinations. Objective specifications are marked on the objective (as shown in the diagram on the right).

NOTE

Refer to the latest catalogue or consult Olympus for the updated information on the eyepieces and objectives that can be combined with this unit.



	Optical characteristics / Series	Marking	Magnification	N.A.	W.D. (mm)	Cover glass thickness (mm)	Resolution (μm)	Eyepieces: WHN10X (FN22) Total mag.	WHN10X (FN22) Depth of focus (μm)	WHN10X (FN22) Field of view (mm)	SWH10X (FN26.5) Total mag.	SWH10X (FN26.5) Depth of focus (μm)	SWH10X (FN26.5) Field of view (mm)
UIS2 series	MPLN Plan Achromat (FN22)	MPlanN	5X	0.10	20.0	–	3.36	50X	98	4.4			
			10X	0.25	10.6	–	1.34	100X	18	2.2			
			20X	0.40	1.3	0	0.84	200X	6.1	1.1	–	–	–
			50X	0.75	0.38	0	0.45	500X	1.4	0.44			
			100X	0.90	0.21	0	0.37	1000X	0.73	0.22			
	MPLN-BD Brightfield/ darkfield Plan Achromat (FN22)	MPlanN-BD	5X	0.10	12.0	–	3.36	50X	98	4.4			
			10X	0.25	6.5	–	1.34	100X	18	2.2			
			20X	0.40	1.3	0	0.84	200X	6.1	1.1	–	–	–
			50X	0.75	0.38	0	0.45	500X	1.4	0.44			
			100X	0.90	0.21	0	0.37	1000X	0.73	0.22			
	MPLFLN Plan Semi-Apochromat (FN26.5) *1.25X:FN22	MPlanFLN	1.25X	0.04	3.5	–	8.39	12.5X	870	17.6	–	–	–
			2.5X	0.08	10.7	–	4.19	25X	220	8.8	25X	220	10.6
			5X	0.15	20.0	–	2.24	50X	59	4.4	50X	59	5.3
			10X	0.30	11.0	–	1.12	100X	15	2.2	100X	15	2.65
			20X	0.45	3.1	0	0.75	200X	5.2	1.1	200X	5.2	1.33
			50X	0.80	1.0	0	0.42	500X	1.3	0.44	500X	1.3	0.53
			100X	0.90	1.0	0	0.37	1000X	0.73	0.22	1000X	0.73	0.27
	MPLFLN-BD Brightfield/ darkfield Plan Semi-Apochromat (FN26.5)	MPlanFLN-BD	5X	0.15	12.0	–	2.24	50X	59	4.4	50X	59	5.3
			10X	0.30	6.5	–	1.12	100X	15	2.2	100X	15	2.65
			20X	0.45	3.0	0	0.75	200X	5.2	1.1	200X	5.2	1.33
			50X	0.80	1.0	0	0.42	500X	1.3	0.44	500X	1.3	0.53
			100X	0.90	1.0	0	0.37	1000X	0.73	0.22	1000X	0.73	0.27
			150X	0.90	1.0	0	0.37	1500X	0.6	0.15	1500X	0.6	0.18
	MPLFLN-BDP Reflected Polarized Light Plan Semi-Apochromat (FN26.5)	MPlanFLN-BDP	5X	0.15	12.0	–	2.24	50X	59	4.4	50X	59	5.3
			10X	0.25	6.5	–	1.34	100X	18	2.2	100X	18	2.65
			20X	0.40	3.0	0	0.84	200X	6.1	1.1	200X	6.1	1.33
			50X	0.75	1.0	0	0.45	500X	1.4	0.44	500X	1.4	0.53
			100X	0.90	1.0	0	0.37	1000X	0.73	0.22	1000X	0.73	0.27
	LMPLFLN Long-WD Plan Semi-Apochromat (FN26.5)	LMPlanFLN	5X	0.13	22.5	–	2.58	50X	70	4.4	50X	70	5.3
			10X	0.25	21.0	–	1.34	100X	18	2.2	100X	18	2.65
			20X	0.40	12.0	0	0.84	200X	6.1	1.1	200X	6.1	1.33
			50X	0.50	10.6	0	0.67	500X	2.5	0.44	500X	2.5	0.53
			100X	0.80	3.4	0	0.42	1000X	0.87	0.22	1000X	0.87	0.27
	LMPLFLN-BD Brightfield/darkfield long-WD Plan Semi-Apochromat (FN26.5)	LMPlanFLN-BD	5X	0.13	15.0	–	2.58	50X	70	4.4	50X	70	5.3
			10X	0.25	10.0	–	1.34	100X	18	2.2	100X	18	2.65
			20X	0.40	12.0	0	0.84	200X	6.1	1.1	200X	6.1	1.33
			50X	0.50	10.6	0	0.67	500X	2.5	0.44	500X	2.5	0.53
			100X	0.80	3.3	0	0.42	1000X	0.87	0.22	1000X	0.87	0.27

Note) When an MPLN-BD series objective is used in darkfield observation with a xenon light source, the peripheral area may be obscured with certain specimens.

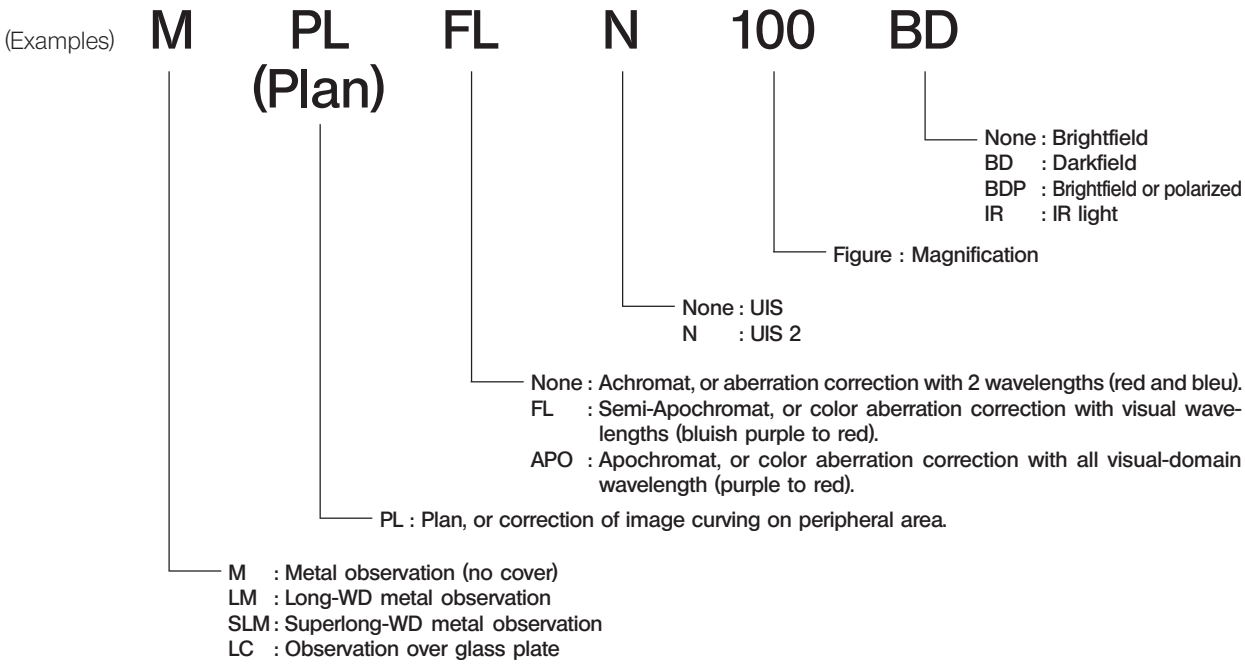
	Optical characteristics / Series	Marking	Magnification	N.A.	W.D. (mm)	Cover glass thickness (mm)	Resolution (μm)	Eyepieces					
								WHN10X (FN22)			SWH10X (FN26.5)		
								Total mag.	Depth of focus (μm)	Field of view (mm)	Total mag.	Depth of focus (μm)	Field of view (mm)
UIS series	MPlanApo Plan Apochromat	MPlanApo	20X	0.60	0.9	0	0.56	200X	3.68	1.1	200X	3.68	1.33
			50X	0.95	0.3	0	0.35	500X	1.04	0.44	500X	1.04	0.53
			100X	0.95	0.35	0	0.35	1000X	0.67	0.22	1000X	0.67	0.27
	MPlanApo-BD Brightfield/darkfield Plan Apochromat	MPlanApo-BD	100X	0.90	0.31	0	0.37	1000X	0.73	0.22	1000X	0.73	0.27
	SLMPlan Superlong-WD Plan Achromat (FN26.5)	SLMPlan	20X	0.35	21.0	0	0.96	200X	7.2	1.1	200X	7.2	1.33
			50X	0.45	15.0	0	0.75	500X	2.9	0.44	500X	2.9	0.53

Objectives for LCD Panel

	Optical characteristics / Series	Marking	Magnification	N.A.	W.D. (mm)	Cover glass thickness (mm)	Resolution (μm)	Eyepieces					
								WHN10X (FN22)			SWH10X (FN26.5)		
								Total mag.	Depth of focus (μm)	Field of view (mm)	Total mag.	Depth of focus (μm)	Field of view (mm)
UIS2 series	LCPLFLN Long-WD Plan Semi-Apochromat (FN26.5)	LCPlanFLN*	20XLCD	0.45	7.4-8.3	0-1.2	0.75	200X	5.2	1.1	200X	5.2	1.33
			50XLCD	0.70	2.2-3	0-1.2	0.48	500X	1.6	0.44	500X	1.6	0.53
			100XLCD	0.85	0.9-1.2	0-0.7	0.39	1000X	0.79	0.22	1000X	0.79	0.27

*Equipped with the glass thickness compensation ring.

Significance of Objective Name


(Examples) M PL (Plan) FL N 100 BD
None : Brightfield
BD : Darkfield
BDP : Brightfield or polarized
IR : IR light
Figure : Magnification
None : UIS
N : UIS 2
None : Achromat, or aberration correction with 2 wavelengths (red and bleu).
FL : Semi-Apochromat, or color aberration correction with visual wavelengths (bluish purple to red).
APO : Apochromat, or color aberration correction with all visual-domain wavelength (purple to red).
PL : Plan, or correction of image curving on peripheral area.
M : Metal observation (no cover)
LM : Long-WD metal observation
SLM : Superlong-WD metal observation
LC : Observation over glass plate

Glossary of Terms Used in the Optical Characteristics Table

Working distance (WD) : The distance from the top of specimen and the front lens of objective.

Number of aperture (NA) : Important figure determining the objective characteristics (resolution, focal depth and brightness).
Resolution ..... Increases in proportion with the NA.
Focal depth ..... Decreases in proportion with the NA.
Brightness ..... Proportional with the square of NA (comparison under the same magnification).

Resolution : The limit that an objective can identify the images of two points that are close to each other, expressed as the distance between the two points on the specimen.

Depth of focus : The maximum depth of the specimen at which the entire specimen can be brought into focus simultaneously. This value increases when the aperture iris diaphragm is narrowed and decreases when the objective NA is increased.

Field number : The diameter of the image area that can be observed through the eyepieces, expressed in mm.

Field of view : The diameter of the area observable on the specimen, expressed in mm.

8 ASSEMBLY

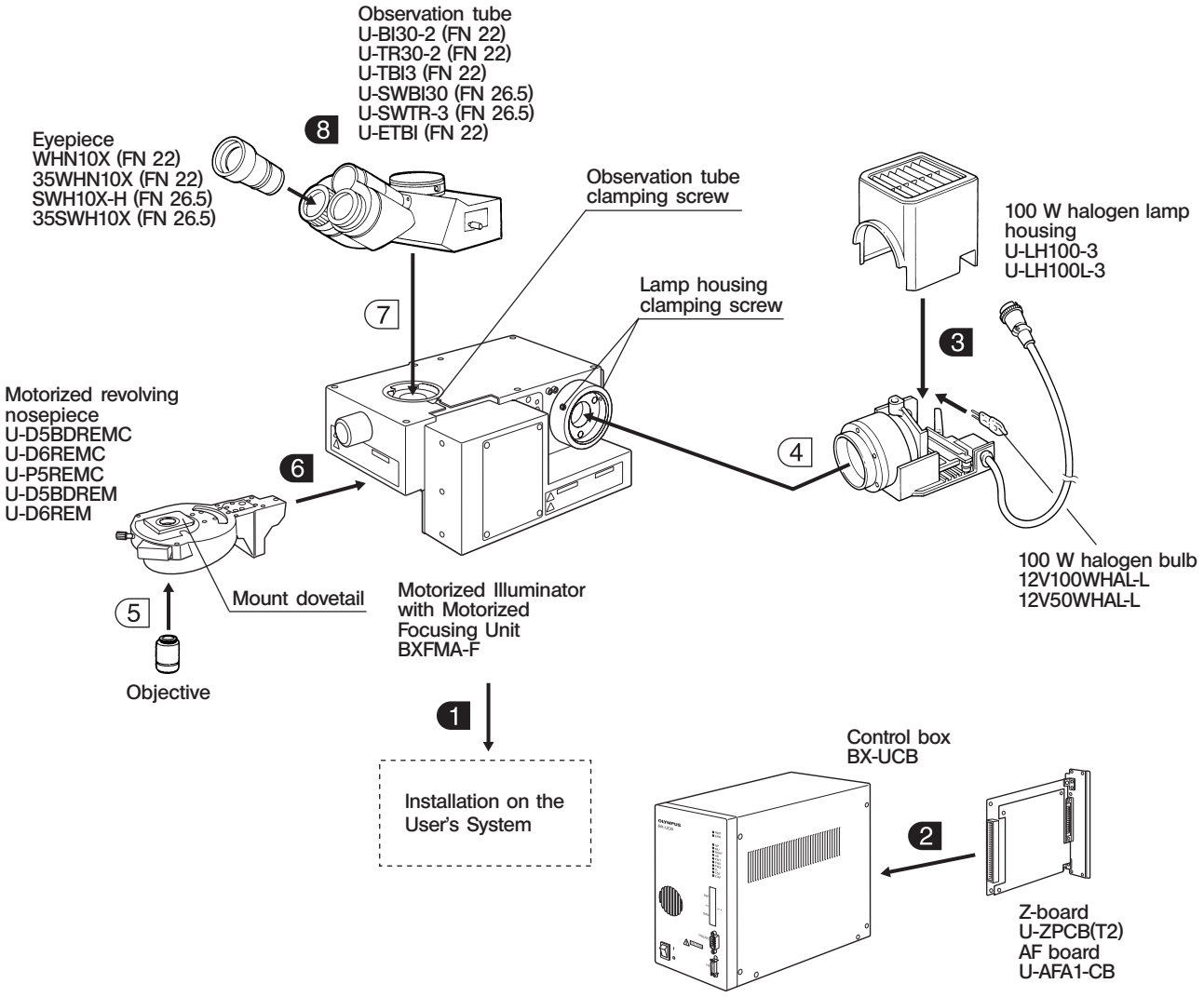
8-1 Assembly Diagram

- The diagram below shows the sequence of assembly of the various modules. The numbers indicate the order of assembly.
- The module model numbers shown in the following diagram are merely the typical examples. For the modules with which the model numbers are not given, please consult Olympus or the catalogues.

★ **When assembling the system, make sure that all parts are free of dust and dirt, and avoid scratching any parts or touching glass surfaces.**

◎ Assembly steps enclosed in ■ will be detailed on the subsequent pages. Please also refer to the instruction manuals provided with the modules.

◎ For the connection of modules, see also Chapter 1, "System Diagram" on page 4.



8-2 Preparations for Assembly

1 Installation on the User's System (Figs. 18 & 19)

◎The illuminator can be installed on the existing system of the user in two ways.
Select the appropriate installation method according to the design and configuration of the user's system.

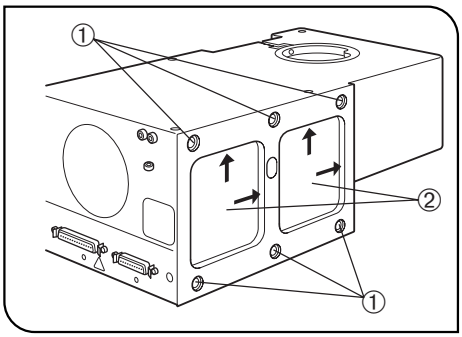


Fig. 18

Installation by the Left Side Panel

The illuminator can be installed by the 6 screw holes ① on the left side panel.

- Attach the illuminator firmly by the 6 bolts (with threaded section length of no more than 10 mm).
  If the number of bolts is insufficient, the illuminator installation may become unstable.
- The installation surface on the illuminator left side panel has two positioning dents ②.
  To obtain the standard position, clamp the illuminator by pushing it up and rightwards by using the dents.

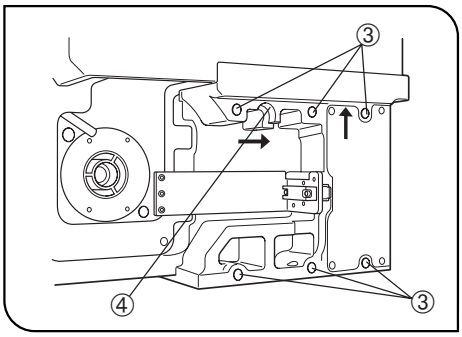


Fig. 19

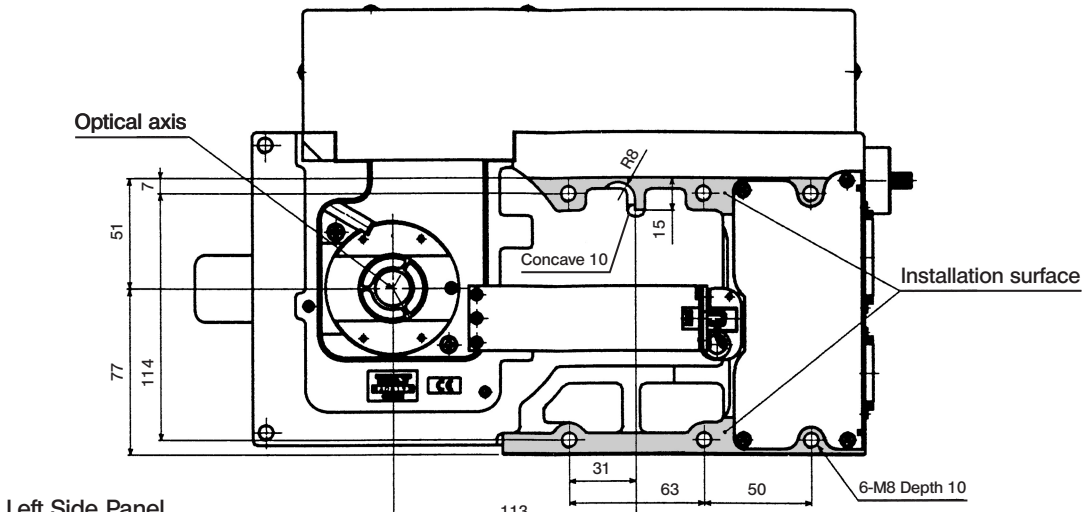
Installation by the Bottom Side Panel

The illuminator can also be installed by the 6 screw holes ③ on the bottom panel.

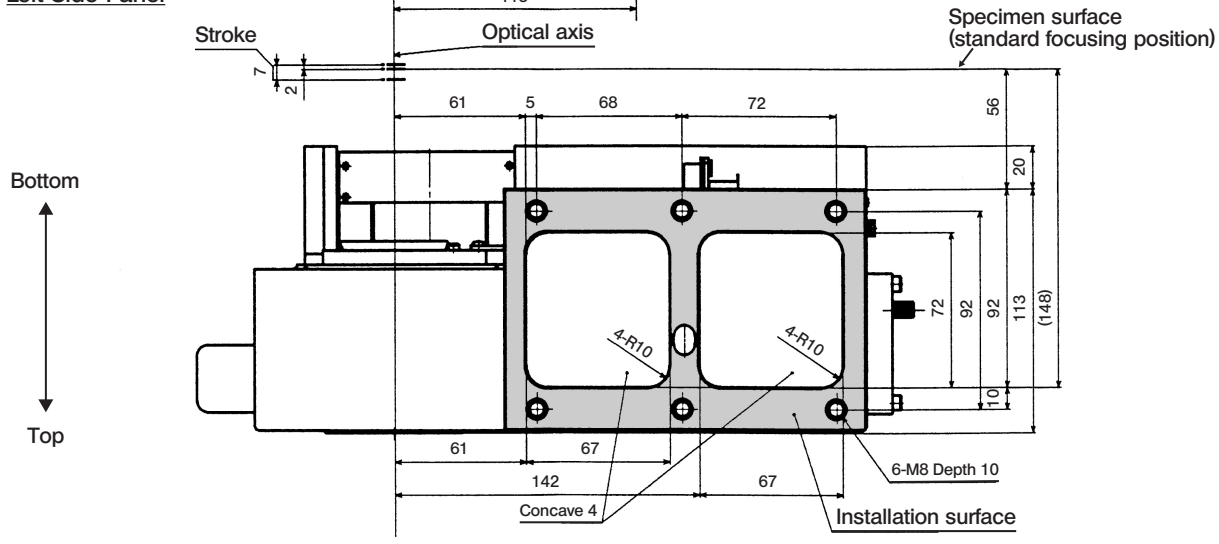
- Attach the illuminator firmly by the 6 bolts (with threaded section length of no more than 10 mm).
  If the number of bolts is insufficient, the illuminator installation may become unstable.
- The installation surface on the illuminator bottom panel has a positioning section ④.
  To obtain the standard position, clamp the illuminator by pushing it up and rightwards by using the positioning section.
- Stop the 6 screw holes ① (Fig. 18) on the left side panel with the provided seals to prevent leakage of light and penetration of dust.

Dimensions of Installation Surfaces

Bottom Panel



Left Side Panel



2 Installing the Z-Board or AF Control Board (Figs. 20 & 21)

◎For use in focusing control, either the Z-board or AF control board can be installed in the BX-UCB control box. Do not install both of these boards for this will lead to malfunction.
When installing the Z-board, be sure to use the U-ZPCB(T2) that is compatible with the BXFMA-F.

★**The Z-board or AF control board is a precision electronic component that could be damaged critically by static electricity. Since the human body is usually charged with a small amount of static, be sure to discharge your body before proceeding to the installation. The static charge in the human body can be discharged by simply touching any metallic object with a finger.**

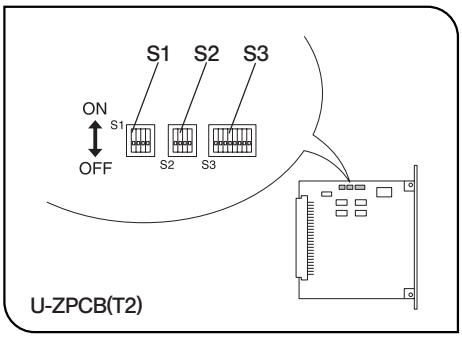


Fig. 20

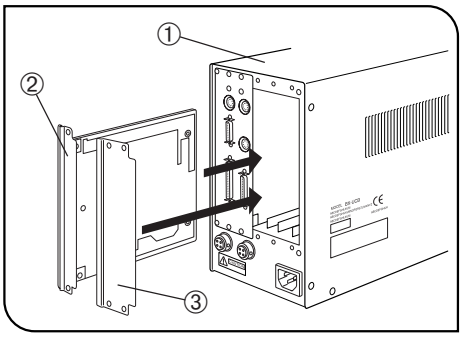


Fig. 21

Installation of the Z-Board or AF Control Board (Figs. 20 & 21)

◎The on-board DIP switches on the Z-board or AF control board have been set at the factory for use with the BX61 microscope. (All of switch segments in SW1, 2 and 3 are set to OFF.)
Change the setting of the DIP switches for use with the BXFMA system.

Changing the On-Board DIP SW Setting (Fig. 20)

★**Leave all other switch segments than those listed below to OFF.**

- S2 Set segment No. 2 and 3 to ON.
- S3 Set segment No. 2 to ON.
- S3 Segment No. 5 is used to set the objective movement direction with respect to the rotation direction of the focus adjustment knob on the U-FH.
  OFF: Objective Up when the knob is rotated toward the front.
  ON: Objective Down when the knob is rotated toward the rear.
  ★**If the switches are set improperly, the objective may lower and collide with the specimen during initialization.**

Installing the Z-Board (Fig. 21)

◎Set the main switch of the BX-UCB control box ① to "O" (OFF) before proceeding to installation.

1. Loosen the 6 clamping knobs of the 2 option slot covers on the rear of the BX-UCB and remove the knobs and covers.
2. Align the orientation of the connector of the Z-board ② with that inside the BX-UCB and insert the board along the board rails.
3. Clamp the Z-board ② with the clamping knobs removed above. Also attach one of the removed covers ③.

◎Retain the cover of the option slot containing the Z-board carefully.

Installing the AF Control Board

◎Refer to the instruction manual provided with the AF unit used.

8-3 Detailed Assembly Procedure

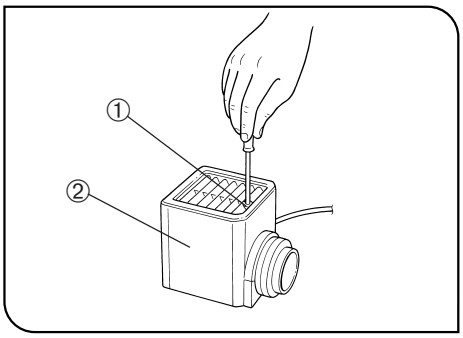


Fig. 22

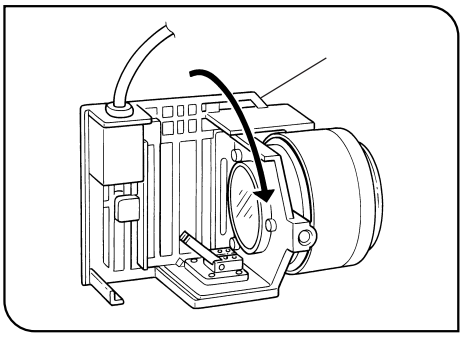


Fig. 23

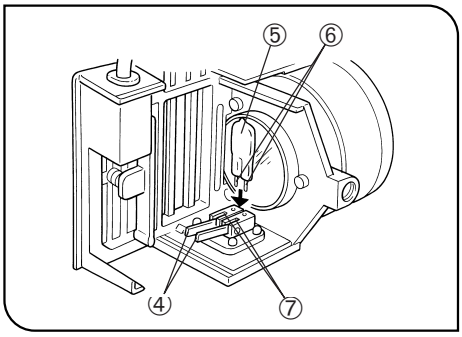
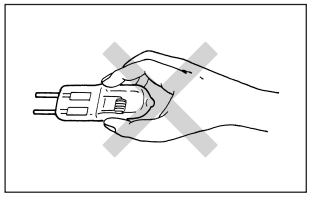


Fig. 24

3 Attaching the Halogen Bulb (Figs. 22 to 24)

◎Use only the designated bulb 12V100WHAL-L (PHILIPS 7724) or 12V50WHAL-L (LIFE JC).

1. Fully loosen the lamp housing clamping screw ① on top of the lamp housing using the Allen screwdriver provided with the illuminator.
2. Lift the lamp housing cover ② upward to remove it.
3. Turn the lamp socket ③ by 90° in the direction indicated by the arrow.
4. Holding the bulb ⑤ with gloves or a piece of gauze, depress the bulb clamping lever ④ and insert the bulb pins ⑥ fully into the pin sections ⑦ on the lamp socket.
   Gently release the bulb clamping lever to the original position to secure the bulb.



▲To prevent reduced bulb life or cracking, do not touch the bulb with bare hands. If fingerprints are accidentally left on the bulb, wipe the bulb with a soft cloth.

5. Slide the lamp housing cover onto the housing base from the above. Tighten the clamping screw ① while pressing downward on the cover. (Fig. 22)

▲Caution for Bulb Replacement During Use or Right After Use

The bulb, lamp housing and areas near these will be extremely hot during and right after use.

Set the main switch to "○" (OFF), disconnect the power cord from the wall outlet, then allow the old bulb and lamp housing to cool before replacing the bulb with a new of the designated type.

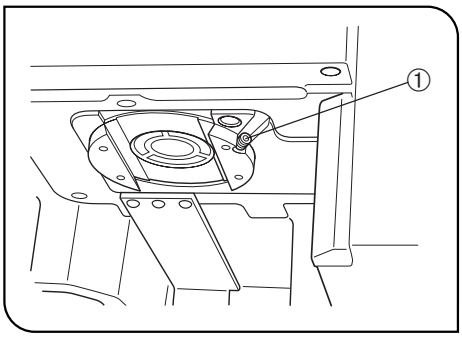


Fig. 25

6 Attaching the Motorized Revolving Nosepiece (Fig. 25)

1. Loosen the revolving nosepiece clamping screw ① using the Allen screwdriver.
2. Align and fit the mount dovetail of the motorized revolving nosepiece with the mount dovetail groove on the illuminator.
3. Push the revolving nosepiece all the way in until the connectors are connected.
4. Tighten the revolving nosepiece clamping screw ①.

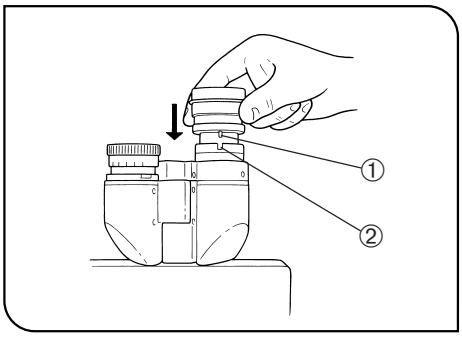


Fig. 26

8 Attaching the Eyepiece (Fig. 26)

Fit the eyepiece into each sleeve as far as it goes.

★**When using the U-BI30-2 binocular tube, eyepiece with built-in micrometer disk cannot be attached.**

★**When using a finder eyepiece or an eyepiece with micrometer disk, insert into the right eyepiece sleeve.**
Insert the eyepiece so that its positioning pin ① fits into the groove ② at the bottom of the eyepiece sleeve.

★**The super-widefield trinocular observation tube is equipped with a positioning notch on both eyepiece sleeves. Make sure that the positioning pins on both eyepieces fits into the respective notches.**

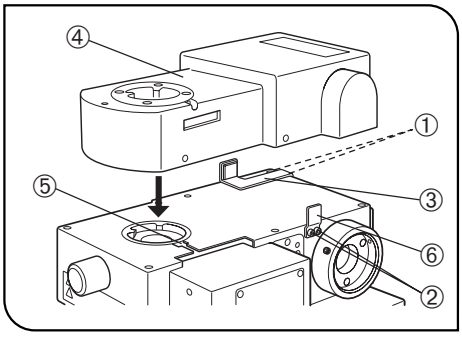


Fig. 27

Attaching the Autofocusing Unit U-AFA1M (Fig. 27)

◎Using the Allen screwdriver, remove a total of 4 AF support bracket clamping screws ① and ② from the illuminator.

1. Attach one of the provided AF support bracket ③ and tighten temporarily the two of the clamping screws ①.
2. Attach the U-AFA1M AF unit ④ on the illuminator and tighten temporarily the observation tube clamping screw ⑤.
3. Attach the other AF support bracket ⑥ and tighten firmly the other two clamping screws ②.
4. Apply the AF unit ④ against the AF support bracket ⑥ and tighten firmly the clamping screw ⑤.
5. Apply the AF support bracket ③ against the AF unit ④ and tighten firmly the clamping screws ①.

MEMO

MEMO

OLYMPUS®

OLYMPUS CORPORATION
Shinjuku Monolith, 3-1, Nishi Shinjuku 2-chome, Shinjuku-ku, Tokyo, Japan
OLYMPUS LIFE AND MATERIAL SCIENCE EUROPA GMBH
Postfach 10 49 08, 20034, Hamburg, Germany
OLYMPUS SURGICAL & INDUSTRIAL AMERICA INC.
One Corporate Drive, Orangeburg, NY 10962, U.S.A.
OLYMPUS UK LTD.
2-8 Honduras Street, London EC1Y OTX, United Kingdom.
OLYMPUS AUSTRALIA PTY. LTD.
31 Gilby Road, Mt. Waverley, VIC 3149, Melbourne, Australia.
OLYMPUS LATIN AMERICA, INC.
6100 Blue Lagoon Drive, Suite 390 Miami, FL 33126-2087, U.S.A.

Printed in Japan 2006 10 M 001–①